

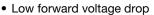
### Vishay Semiconductors

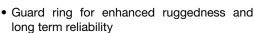
# High Performance Schottky Rectifier, 1.0 A



PRODUCT SUMMARY				
I <sub>F(AV)</sub>	1.0 A			
$V_{R}$	60 V			
V <sub>F</sub> at I <sub>F</sub>	0.42 V			
I <sub>RM</sub>	8 mA at 125 °C			
T <sub>J</sub> max.	150 °C			
E <sub>AS</sub>	2.0 mJ			
Package	SMB			
Diode variation	Single die			

#### **FEATURES**







- Small foot print, surface mountable
- High frequency operation
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Material categorization: for definitions of compliance please see <a href="https://www.vishay.com/doc?99912"><u>www.vishay.com/doc?99912</u></a>

#### **DESCRIPTION**

The VS-10BQ060-M3 surface mount Schottky rectifier has been designed for applications requiring low forward drop and very small foot prints on PC boards. Typical applications are in disk drives, switching power supplies, converters, freewheeling diodes, battery charging, and reverse battery protection.

MAJOR RATINGS AND CHARACTERISTICS					
SYMBOL	CHARACTERISTICS	CHARACTERISTICS VALUES UNITS			
I <sub>F(AV)</sub>	Rectangular waveform	1.0	Α		
V <sub>RRM</sub>		60	V		
I <sub>FSM</sub>	$t_p = 5 \mu s sine$	700	Α		
V <sub>F</sub>	1.0 A <sub>pk</sub> , T <sub>J</sub> = 125 °C	0.42	V		
T <sub>J</sub>	Range	-55 to +150	°C		

VOLTAGE RATINGS				
PARAMETER	SYMBOL	VS-10BQ060-M3	UNITS	
Maximum DC reverse voltage	$V_{R}$	60	V	
Maximum working peak reverse voltage	$V_{RWM}$	60	V	

ABSOLUTE MAXIMUM RATINGS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum average forward current	I <sub>F(AV)</sub>	50 % duty cycle at T <sub>L</sub> = 116 °C	, rectangular waveform	1.0	Α
Maximum peak one cycle	1	5 μs sine or 3 μs rect. pulse	Following any rated load condition and with	700	Α
non-repetitive surge current	IFSM	10 ms sine or 6 ms rect. pulse	rated V <sub>RRM</sub> applied	42	A
Non-repetitive avalanche energy	E <sub>AS</sub>	$T_J = 25 ^{\circ}\text{C},  I_{AS} = 1  \text{A},  L = 4  \text{mH}$ 2.0 mJ		mJ	
Repetitive avalanche current	I <sub>AR</sub>	Current decaying linearly to zero in 1 $\mu$ s Frequency limited by T <sub>J</sub> maximum V <sub>A</sub> = 1.5 x V <sub>R</sub> typical  1.0  A		Α	



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ELECTRICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
	V <sub>FM</sub> <sup>(1)</sup>	1 A	T <sub>J</sub> = 25 °C	0.49	V
Maximum forward voltage drop		2 A		0.60	
See fig. 1		1 A	T <sub>J</sub> = 125 °C	0.42	
		2 A		0.56	
Maximum reverse leakage current		T <sub>J</sub> = 25 °C	V <sub>R</sub> = Rated V <sub>R</sub>	0.1	mA
See fig. 2	I <sub>RM</sub>	T <sub>J</sub> = 125 °C	VR = nateu VR	8.0	IIIA
Typical junction capacitance	C <sub>T</sub>	$V_R = 5 V_{DC}$ (test signal range 100 kHz to 1 MHz), 25 °C		80	pF
Typical series inductance	L <sub>S</sub>	Measured lead to lead 5 mm from package body		2.0	nH
Maximum voltage rate of charge	dV/dt	Rated V <sub>R</sub> 10 000		10 000	V/µs

#### Note

 $<sup>^{(1)}</sup>$  Pulse width = 300  $\mu$ s, duty cycle = 2 %

THERMAL - MECHANICAL SPECIFICATIONS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction and storage temperature range	T <sub>J</sub> <sup>(1)</sup> , T <sub>Stg</sub>		-55 to +150	°C
Maximum thermal resistance, junction to lead	R <sub>thJL</sub> <sup>(2)</sup>	DC operation	36	°C/W
Maximum thermal resistance, junction to ambient	R <sub>thJA</sub>		80	C/VV
Approximate weight			0.10	g
Approximate weight			0.003	oz.
Marking device		Case style SMB (similar DO-214AA)	11	Н

#### Notes

<sup>(1)</sup>  $\frac{dP_{tot}}{dT_J} < \frac{1}{R_{thJA}}$  thermal runaway condition for a diode on its own heatsink

<sup>(2)</sup> Mounted 1" square PCB

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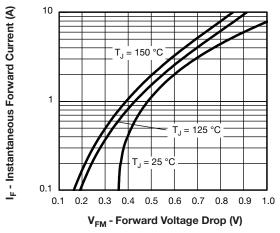


Fig. 1 - Maximum Forward Voltage Drop Characteristics

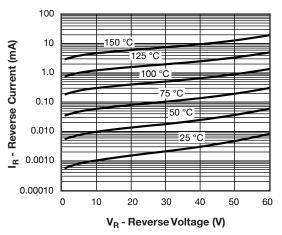


Fig. 2 - Typical Peak Reverse Current vs. Reverse Voltage

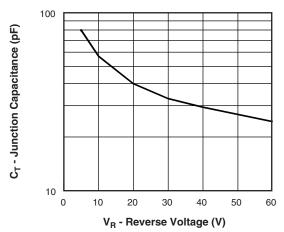


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

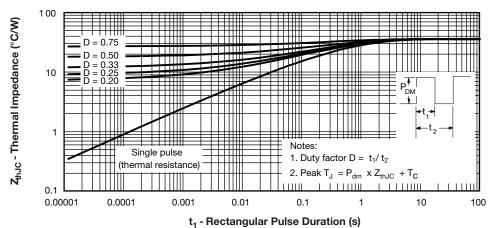


Fig. 4 - Maximum Thermal Impedance Z<sub>thJC</sub> Characteristics (Per Leg)

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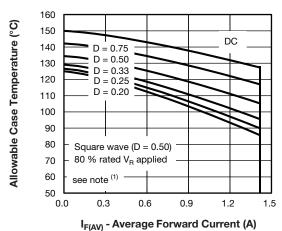


Fig. 5 - Maximum Average Forward Current vs.
Allowable Lead Temperature

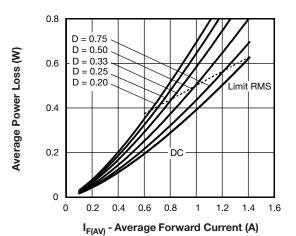


Fig. 6 - Maximum Average Forward Dissipation vs. Average Forward Current

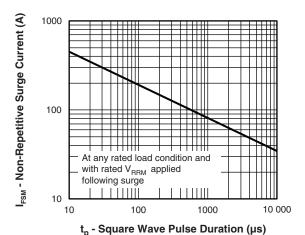


Fig. 7 - Maximum Peak Surge Forward Current vs. Pulse Duration

### Note

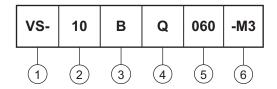
 $\begin{array}{ll} \text{(1)} & \text{Formula used: } T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}; \\ Pd = \text{Forward power loss} = I_{F(AV)} \times V_{FM} \text{ at } (I_{F(AV)}/D) \text{ (see fig. 6);} \\ Pd_{REV} = \text{Inverse power loss} = V_{R1} \times I_R \text{ (1 - D); } I_R \text{ at } V_{R1} = 80 \text{ \% rated } V_R \\ \end{array}$ 



### Vishay Semiconductors

#### **ORDERING INFORMATION TABLE**

**Device code** 



- 1 Vishay Semiconductors product
- 2 Current rating
- 3 B = SMB
- 4 Q = Schottky "Q" series
- 5 Voltage rating (060 = 60 V)
- 6 Environmental digit:

-M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)						
PREFERRED P/N	RED P/N PREFERRED PACKAGE CODE MINIMUM ORDER QUANTITY PACKAGING DESCRIPTION					
VS-10BQ060-M3/5BT	5BT	3200	13" diameter plastic tape and reel			

LINKS TO RELATED DOCUMENTS				
Dimensions <u>www.vishay.com/doc?95401</u>				
Part marking information	www.vishay.com/doc?95403			
Packaging information	www.vishay.com/doc?95404			
SPICE model	www.vishay.com/doc?95638			



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